Investigating the Risks of Airborne Particulate Matter Using the National Medicare Cohort

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The Johns Hopkins particulate matter (PM) Research Center will focus its studies on a population most susceptible to the effects of particulate matter—the elderly. Over the next five years, the Center's researchers will identify those areas in the United States where PM exposure poses greater and lesser estimated risks to human health in this older population, collect and characterize particles in these locations, and assess their toxicity in a battery of assays relevant to pulmonary and cardiovascular outcomes.

The Center's three-phase program builds progressively from mapping health risks of PM across the US based on analysis of national databases, including one developed for air pollution and another developed through a Science To Achieve Results (STAR) grant that built a nationwide cohort of Medicare participants for information on mortality and hospitalization. During this first phase, researchers will identify those cities and regions where risks have been estimated to be highest and lowest; explore patterns of PM characteristics across the United States, develop protocols for detailed PM monitoring and collection of sufficient materials for bioassays, adapt existing *in vitro* and *in vivo* bioassays for assessing the comparative toxicity of the PM samples, and develop relevant microarray approaches.

In the second phase, the Center will monitor and collect PM from 10 sites selected from the higher and lower extremes of the effects of PM on human health and assess the comparative toxicity of the PM samples in the bioassay battery. The third phase is likely to involve assessment of risks of more toxic particles in susceptible populations, source-related relative risk characterization, exposure assessment studies, and more focused studies of mechanisms of injury by these particles. Collectively, these three phases will advance the science on linking health effects of PM with specific characteristics and sources of particles and advance understanding of the health responses in susceptible individuals.

Researchers at the Johns Hopkins Center will build on their previous work in this field, including results soon to be published from a recent STAR grant using the National Medicare Cohort. The study examined specific cardiopulmonary health outcomes associated with exposures to fine PM (including congestive heart failure, ischemic heart disease, heart rhythm, and chronic obstructive pulmonary disease).

The Johns Hopkins PM Research Center brings together a multidisciplinary research team of biostatisticians, epidemiologists, exposure assessors, lung biologists and respiratory toxicologists, pulmonary clinicians, and atmospheric scientists to address the most critical gap in the current understanding of health and PM.

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